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EXD.

DIRECTORATE OF PLANT PROTECTION, QUARANTINE AND STORAGE
MINISTRY OF FOOD AND AGRICULTURE, GOVERNMENT OF INDIA

LANT PROTECTION BULLETIN

SCIENCE IN PRACTICE

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NOTE

Plant Protection Bulletin is intended to keep all Plant Protection Workers in India informed of the progress of control work on plant pests and diseases in different parts of the country and of the advances and developments in Plant Protection work in other parts of the world. Suitable articles, reports, notes, observations and comments received from workers all over India will be published in the bulletin. The notes from correspondents may also be in the form of suggestions, queries and opinions, even tentative, offered for discussion or consideration. The reports should in particular, contain information on the sudden outbreak of diseases or pests or the equally sudden disappearance of other diseases or pests from a particular area. The progress made in spraying, dusting and other methods of disinfestation should form a prominent part of the reports. The intensity and severity of a disease or pest, or the absence of a pest or disease from a particular area and the prevalent conditions should be noted. If some varieties of a crop are not affected by a disease or pest, whereas others occurring in the vicinity have been attacked by them, then such information would be extremely useful. In reports containing control operations against pests and diseases, the cost of these operations and the savings obtained therefrom must be invariably stated. In accepting and publishing any material received from contributors, the Directorate of Plant Protection, Quarantine and Storage serves merely as an informational clearing house; it does not assume responsibility of the subject-matter.

Any suggestions for the improvement of this Bulletin will be gratefully received.

HEM SINGH PRUTHI,

Plant Protection Adviser to the Govt. of India.

PLANT PROTECTION WORK IN MADRAS STATE DURING THE QUARTER ENDING 31st MARCH, 1951*

Diseases

Occurrence of crop diseases in the districts : Blast of paddy was observed in the districts of Chittoor, Cuddapah, Anantapur, Tirunelvelli, Chingleput, Tanjore, Coimbatore, South Arcot and Ramanathapuram. Blast of Ragi was observed in Chittoor District ; Tobacco mildew occurred in Anantapur, Krishna, Guntur and Coimbatore Districts and tobacco damping off in Cuddapah. Powdery mildew of chillies assumed epiphytotic proportions in the districts of Krishna, Guntur and Nellore. Sugarcane smut occurred in East Godavari and Chittoor Districts. Leaf blight of onion was observed in Bellary, Srikakulam, Krishna, Vizagapatanam and Nellore Districts. Plantain wilt was noticed in Vizagapatanam and East Godavari Districts. Mildew on citrus was observed in Madura, Tirunelvelli and Nilgiris.

1. Paddy :

(*a*) **Blast :** 488 acres were treated with Bordeaux mixture or Perenox as a measure of control against paddy blast in the districts of Cuddapah, Chittoor, Tirunelvelli, Coimbatore, South Arcot and Ramanathapuram.

(*b*) **Footrot :** (*Fusarium moniliforme*) and *Helminthosporiose* (*Helminthosporium oryzae*). Seed treatment with Agrosan G. N. was carried out in the districts of East and West Godavari, Chittoor, Tirunelvelli, Tiruchirapalli, North Arcot ; Salem, Coimbatore, Chingleput and South Kanara. In all, seed to cover an area of 6,753 acres were treated.

2. Sorghum :

Grain Smut : (*Sphacelotheca sorghi*). Sulphur to treat seed sufficient to cover an area of 26,868 acres in all was sold to the ryots in the following districts Coimbatore, Ramanathapuram, Tirunelvelli, Salem, Madura, Tiruchirapalli, North Arcot, Bellary and Anantapur.

3. Ragi :

Blast (*Piricularia sp.*) Perenox was sprayed over an area of 20 acres in the Chittoor, Coimbatore and Chingleput Districts, where the disease was noticed during the season.

4. Italian millet (*Setaria italica*) :

Smut (*Ustilago crameri*). Sulphur to treat seeds to cover an area of 750 acres was sold in the Districts of Anantapur and Bellary.

5. Sugarcane :

(*a*) **Smut** (*Ustilago scitaminae*). Measures to control the disease was demonstrated in an area of 11 acres in the Chittoor and East Godavari Districts

(*b*) **Red rot :** (*Colletotrichum falcatum*). Selection and treatment of setts were demonstrated in the district of South Arcot, North and South Kanara in about 98 acres.

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* Extract from Plant Protection Report for the quarter ending 31st March, 1951.

6. Citrus :

(Foliocellosis). : 31, 494 trees were treated for this disease during the quarter by the application of Zinc Sulphate lime mixture. The disease was prevalent throughout the citrus growing areas in the State.

Die back : 2,520 trees were treated by spraying Bordeaux mixture.

Canker : 4,860 trees were sprayed with Bordeaux mixture in Tirunelvelli, Madurai, Tanjore, Tiruchirapalli, Pattukottai, Chingleput, North Arcot, Malabar and Salem.

Gummosis and Collar rot : 17,145 trees were treated for gummosis in the Northern districts.

Mildew : 776 trees were dusted with sulphur for this disease.

7. Mangoes :

2,170 trees were treated for pink disease (removing diseased portions and spraying with Bordeaux mixture) in South Malabar and South Arcot Districts. 1,120 were dusted with sulphur for control of mildew in the districts of Tirunelvelli, Tiruchirapalli and Tanjore. 1,350 trees were sprayed with Perenox as a control measure against 'leafspot' disease.

8. Grape Vine :

Powdery Mildew : 20 acres of vine were sprayed with Bordeaux mixture for control of mildew in the districts of Madurai, Coimbatore, Tirunelvelli, Ramnad and Tiruchirapalli.

9. Other Crops :

Chillies : (*a*) **Fruit rot** (*Colletotrichum capsici*). 1,231 acres were sprayed with copper fungicides for the control of fruit rot of chillies in the districts of Guntur, Kurnool, East Godavari, Sri Kakulam, Anantapur, Anakapalle, Nellore and Chittoor, Tirunelvelli, Ramanathapuram, Chingleput, Tanjore, South Arcot and Salem Districts.

(*b*) **Mildew** (*Oidiopsis taurica*) : 106 acres were sprayed with Perenox for the control of the disease.

10. Onion :

Leaf Blight (*Alternaria palanduii*) : 20 acres of this crop were sprayed with Perenox or Bordeaux mixture in the affected areas in Bellary, Sri Kakulam, Krishna, Kurnool, South Arcot and Coimbatore districts.

11. Plantain :

Measures to control wilt disease were demonstrated in East Godavari, West Godavari, Tirunelvelli and Ramanathapuram districts. The area involved was 130 acres.

12. Tobacco :

21 acres were sprayed with Perenox for the control of mildew in Coimbatore District.

13. Turmeric :

Leaf spot (*Colletotrichum capsici*) : 187 acres were sprayed with Bordeaux mixture for control of leaf spot disease in Guntur, East Godavari and Kurnool Districts.

14. Coconut :

(*a*) **Stem bleeding disease** (*Ceratostomella paradoxa*) : 3,000 trees were treated for the control of the disease in East Godavari, West Godavari, Tanjore, Ramanathapuram, Tirunelvelli, Salem, Malabar and South Canara districts.

(*b*) **Bud rot** : 212 palms were sprayed with Bordeaux mixture for bud rot in Malabar.

(*c*) **Leaf spot**: 11,000 seedlings (in the nursery) were sprayed with Bordeaux mixture as a prophylactic measure in Malabar and Tiruchirapalli districts.

15. Sweet Potato :

24 acres of this crop were sprayed with Bordeaux mixture.

16. Vegetable Crops :

Attention was also paid to treatment of diseases of Tomato, Brinjals and other vegetable crops in all the districts.

PESTS

Paddy :

The army worm of rice (*Spodoptera mauritia*) : This pest occurred in a severe form in the districts of East and West Godavari, Nellore, Chittoor, Bellary and Guntur in the northern zone and in South Arcot, Malabar and South Kanara in the Southern zone. Adequate relief was obtained by treating the affected areas either by spraying or dusting DDT 5 per cent or BHC 10 per cent. BHC 10 per cent dust was effective only against the earlier stages of the caterpillars while the DDT formulations were effective against all stages of the insect. In all a total area of 682·8 acres were tackled resulting in the saving of 4·3 tons of paddy which would otherwise have been lost.

The Green Jassid (*Nephotettix bipunctatus*) was reported from stray localities in the districts of Cuddapah, Nellore, Chittoor, Ellore, South Arcot, Tiruchirapalli, Madurai and Tirunelvelly. These bugs were controlled by DDT either as dusts or sprays. About 69 tons of paddy are estimated to have been saved in the Southern districts alone by adopting the above control measures, the area treated being 512 acres.

The rice case worm (*Nymphula depunctalis*) was severe in parts of Chingleput, S. Kanara and Malabar and was controlled by the application of DDT either as dust or 5 per cent spray at 0·16 per cent concentrations or by dusts of BHC at 10 per cent. All these treatments were effective only in localities where there were facilities for draining before treatment. But as the pest was endemic in low lying areas this measure of control was not effective in all cases. About 67 tons were saved by the adoption of these control measures, the area treated being 998 acres.

The Rice Hispa (*Hispa armigera*) was rather bad in parts of Salem, N. Arcot and Malabar. This was readily controlled by the prompt dusting of BHC 10 per cent after clipping the tops of the affected seedlings. About 248 acres were so treated and a possible loss of about 15 tons of paddy was averted.

Paddy stem borer (*Schoenobius incertellus*) : The incidence of this borer was severe in parts of Tanjore, Chingleput, Malabar, Tinnevelly and Tiruchirapalli districts and mild in the northern zone. The dipping of the seedlings in DDT suspensions before planting as a prophylactic measure did not prove to be effective in years of severe infestation, but the spraying of either BHC or DDT exerted certain amount of control. The affected seedlings in 440 acres were sprayed and thus prevented a potential loss of about 20 tons of paddy.

Rice bug (*Leptocorisa acuta*) was found sporadically in the southern districts of this state and was found amenable to dustings with 9 per cent BHC and thus a loss of nearly 60 tons of paddy was averted.

Paddy leaf roller (*Cnaphalocrocis medinalis*) was noted as a pest in the districts of Cuddapah, Nellore, Chittoor and Ellore and in severe form in Tanjore and South Kanara. BHC 10 per cent dust was very effective against these caterpillars and by the dusting of about 100 acres nearly 3 tons of paddy was saved.

Miscellaneous insect pests of paddy : The paddy mealy bug (*Ripersia oryzae*), the white jassid (*Tettigoniella spectra*), the thrips (*Thrips oryzae*), the small grass hopper (*Oxya velox*) were of minor importance and were controlled wherever noted by the application of suitable formulations of BHC and DDT. An area of 750 acres was treated against these pests in the northern zone, resulting in the saving of produce worth Rs. 23,000 while about 6 tons of paddy were saved in the southern zone.

Millets :

1. **Cholam** was particularly free from any insect infestation during the period under report, excepting stray occurrences of the borer, *Chilo zonellus* and the red mite. The former was controlled over an area of 44 acres by the application of BHC 10 per cent dust resulting in the saving of 3 tons of grain and the latter by the dusting of 20 per cent sulphur.

The cholam ear bug (*Calocoris angustatus*) was checked in Coimbatore district in 3 acres by dusting 10 per cent BHC and thus a loss of about 1½ tons of grains was prevented.

The Ragi flea beetle (*Chaetocnema* sp.) was found infesting 24 acres of cholam in Ramnad and Tirunelvely districts. Prompt measures were taken to control this and about 1½ tons of cholam were thus saved.

2. Ragi : The Ragi flea beetle (*Chaetocnema* sp.) was severe in the nurseries in parts of Tirunelvelly, Ramnad and Tiruchirapalli and was controlled readily by the application of 10 per cent BHC dusts and thus the seedlings were saved from destruction. An area of 64·75 acres of infested Ragi was protected against insect pests by dusting BHC 5 per cent powder and about 25 tons of grains were saved.

Vegetables :

Brinjals were affected by the Epilachna beetles wherever grown and was particularly bad at Ramanathapuram. The crop in an area of 243 acres was saved by the application of Calcium arsenate either as dust or spray thus saving

a loss of about 60 tons of vegetables. Other minor pests like jassids and mites were controlled over an area of 21 acres, resulting in the saving of 4 tons of produce.

Chillies. The use of BHC either as dusts or sprays against chillies thrips (*Scirtothrips dorsalis*) has become a regular farming practice in the chillies growing areas of Tinnevelly and Ramnad. About 3,264 acres of chillies were treated, resulting in an estimated saving of about 72 tons of produce, in the southern zone while an area of 12,074 acres in North zone saving produce valued at Rs. 5,07,396.

Onions. *Thrips tabaci* on onions in 74 acres of the southern zone was effectively controlled by BHC sprays and thus averted a potential loss of 37 tons of produce. In the North zone 487·60 acres were sprayed against the pest resulting in the saving of produce valued at Rs. 77,095.

Potatoes in the Nilgiris, Yercaud and Singampatti were found to have a severe infestation by the cut worms (*Euxoa segetum*) and these were checked by dusting 29 acres of affected crop with 5 per cent BHC and thus the probable loss of 14 tons of potatoes was prevented.

Cockchafers in potato fields in the Nilgiris were prevented from damaging the potato crop in all acres of badly infested potatoes by the application of BHC and effected a saving of 51 tons of potatoes.

Cruciferae. About 56 acres of cabbages and cauliflowers infested by the cut worms (*Agrotes* sp.) were treated with 5 per cent BHC dust resulting in the saving of 56 tons of greens.

Aphids on 20 acres of vegetables were controlled by the spraying of fish oil rosin soap and thus a loss of 11 tons of the produce was prevented.

In the northern region 2,352 acres of vegetables were treated against the different insect pests and vegetables to the value of Rs. 69,958 were saved.

Fruits :

Mango. The mango hopper (*Idiocerus* sp.) was not much in evidence as the flowering was poor. Yet a total of 3,336 trees were sprayed with DDT at 0·15 per cent concentration and thus fruits to the value of Rs. 25,000 were saved from utter ruin and loss.

Citrus. The citrus leaf caterpillar (*Papilio demoleus*), aphis, mealy bug and mites were the important pests tackled against and in all 4,737 trees were sprayed with suitable insecticides. As the pests were all affecting the leafy parts, it is not possible to estimate the economic gain by the adoption of the control measure.

Grape vines. 46 acres of grape vines affected by the flea beetle (*Scelodonta strigicollis*) were sprayed with DDT and thus prevented a loss of 23 tons of fruits. In the northern zone 50,571 fruit trees were treated in all against their respective pests occurring in the saving of fruits to the value of Rs. 99,116. The mango hoppers (*Idiocerus* sp.), citrus caterpillars (*Papilio* sp.) and the red tree ant (*Oecophylla* sp.) were among the pests so controlled.

Cotton. 143 acres of cotton were treated against the various pests as jassids, leaf rollers and Red cotton bugs in parts of Coimbatore, Salem, Trichy, Ramnad and Pattukottai by the use of DDT and BHC either alone or in combination with sulphur. About 14 tons of kappas are estimated to have been saved as a result of these treatments. In the northern zone 5 acres of cotton badly infested by mites were protected by the dusting of sulphur.

Oil seeds and palms :

Coconuts. Round about Tiruchirapalli and Tanjore coconut seedlings affected by white ants were sprayed with DDT and saved 9,370 seedlings. *Oryctes rhinoceros* attacking 450 coconut trees in all in parts of Bellary, West Godavari, Guntur and Krishna were examined and the beetles removed by hooking. Parasites of *Nephantis serinopa* were released in 1801 acres of affected coconut gardens in the districts of Guntur, East and West Godavari.

Castor. In the districts of Guntur and Nellore 31·5 acres infested by the semilooper, *Achoea* were sprayed with calcium arsenate and produce worth about Rs. 2,000 was saved.

Groundnut. Rats were found damaging 21 acres of groundnuts in East Godavari and baiting with zinc phosphide was tried with success, resulting in a saving of Rs. 4,200.

Tobacco. 103·5 acres of tobacco infested by aphids in West Godavari, Krishna and Nellore were sprayed with either fish oil rosin soap or tobacco decoction and saved Rs. 3,350 worth of tobacco which would otherwise have been lost.

Gingelly. The leaf and pod boring caterpillar (*Antigastra* sp.) infesting 14 acres of gingelly in West Godavari was dusted with 5 per cent BHC resulting in the saving of Rs. 700 worth of gingelly.

Pulses :

Aphis attacking green and black grams in 111 acres in parts of Krishna and Guntur was dusted with 5 per cent BHC at 20 lb. per acre with encouraging results. The green gram leaf caterpillar (*Azazia rubricans*) infesting 35 acres in Pattukottai was dusted with 10 per cent BHC and saved a loss of about 2 tons of pulses.

Gunomys kok damaging pulses in the field in Guntur was prevented from damaging the crop further over an area of 2·46 acres by baiting with zinc phosphide, thus saving the produce worth Rs. 2,200.

Betel vine. The betel vine bug (*Disphinctus politus*) in 74·76 acres at Cuddapah was controlled by DDT spray thus saving the produce worth Rs. 3,733.

Agathi. Plant lice infesting 4·5 acres of Agathi was kept in check in Cuddapah by BHC spray (2 oz. of 50 per cent BHC in a gallon).

Mustard. Defoliator infesting 4 acres in Kurnool was dusted with BHC and about Rs. 200 worth of produce saved.

Rodent pests

In the Southern zone, with the harvest of the Somba paddy, the damage by the field rats ceased in all paddy areas. Control by poison baiting with zinc phosphide was done in 2,621 acres of paddy area, 3 acres of sugarcane, 227 acres of potatoes, 23 acres of wheat, 10 of cotton and 320 of chillies. These measures are believed to have effected a saving of about 30 tons of paddy, 4 tons of sugarcane, 26 tons of potatoes, a ton of wheat, ½ ton of kappas and 6 tons of chillies.

In the northern zone, zinc phosphide baiting was tried in 3027.5 acres of paddy lands resulting in the saving of 428 tons of paddy, which would otherwise have been lost.

Control of stored product pests :

In the northern zone, 3,140 bags of paddy seeds and in the southern zone 7,150 bags of paddy seeds, 34 of cholam, 14,000 lb. of seed potato were treated against their respective pests and the seed materials preserved from damage.

Cattle pests :

6,540 heads of cattle infested with ticks were treated in all in the districts of West Godavari, Guntur, Cuddapah, Kurnool, Anantapur and Bellary by the application of BHC paste to the affected parts.

PRELIMINARY OBSERVATIONS ON THE FIELD TRIAL OF SOME PROPRIETARY INSECTICIDES

Introduction : The Directorate of Plant Protection, Quarantine and Storage receives numerous samples of insecticides from the various manufacturers direct or through their dealing agents both in India and abroad for field tests against various insects under Indian conditions. All manufacturers claim high efficacy for their products. This note deals with preliminary observation, of the trials made with insecticides like parathion, chlordan, toxaphene and T.E.P.P. etc.

Vapotone XX spray

Composition : It is in the form of a liquid concentrate containing by weight the following ingredients :-

Tetra-ethyl-pyro-phosphate (T.E.P.P.)	.. ..	20 per cent.
Other related organic phosphates	.. ..	30 per cent.
Inert ingredients	.. ..	50 per cent.

Availability : This product was supplied by California Spray Chemical Corporation through their agents, Kodak Limited, Bombay. Some other firms market such a product in a more concentrated form i.e., containing 40 per cent of T.E.P.P.

Properties : Tetra ethyl pyrophosphate is a contact poison and is reported to be equal in its toxicity to nicotine sulphate. It is considered effective against aphids, whiteflies, thrips, red spider, leaf hopper nymphs woolly aphis, etc., when DDT fails. However, it is advantage over nicotine sulphate in one respect viz., it remains effective even at temperatures which are low for nicotine. It readily decomposes into non-toxic substances and can be used on food crops a day or two before marketing. It is very hygroscopic and decomposes in store if not kept under airtight conditions. Prolonged contact with water or inert alkali causes decomposition. T.E.P.P. is compatible with BHC, DDT, neutral copper fungicides and wettable sulphur but must not be mixed with Bordeaux mixture or lime sulphur.

It is recommended to be used in dilution of

20 per cent	.. 7 fluid ounces in 100 gallons of water.
40 per cent	.. 4 fluid ounces in 100 gallons of water.

It is safe for use on many plants but it might cause injury to tomato, chrysanthemum and cyclamen plants when applied at temperature below 65° F.

Caution : Its contact with skin or the eyes at the time of spraying should be avoided.

Results of spraying trials : Tetra ethyl pyrophosphate is the active ingredient in Vapotone. It had been tried a number of times in ratio of 1 : 1600 with water (T. E. P. P., 0·0125) against bean aphis (*Aphis laburni*), wheat louse (*Macrosiphum granarium*) and cabbage aphis (*Brevicoryne brassicae*) between September and March. Average percentage of kill obtained of various aphids was 95, 90 and 85 in the order stated.

From the trials it was evident that one spray was enough to control the wheat louse in March. In case of bean aphis one spraying was found enough if thoroughly sprayed in the beginning of attack, otherwise a second spray was necessitated three to four weeks after the first. Owing to low kill obtained in case of cabbage aphis, the spray had to be repeated at short intervals.

Over 90 per cent mortality was obtained when the insecticide was applied at the same strength against mustard aphis (*Rhopalosiphum pseudobrassicae*) and green aphis (*Myzus persicae*) occurring as pests on *sarson*, radish, turnip and sugar beet in over a dozen trials throughout winter. The mustard aphis is one of the pernicious pests and if not kept under control by spraying, it brings about total failure of the crop. It has been noted from field observations that the aphids require sprayings after an interval of 10-15 days throughout winter, especially when it is prevalent in the epidemic form.

Vapotone was also applied at the above strength against the adults of the white fly (*Bemisia tabaci*) on brinjal, red mites on marigold and white flies (eggs, nymphs and adults) on jasmine and it was observed that the insecticide did not cause appreciable mortality of the pests concerned.

Phytotoxy: It may be stated here that no phytotoxy was observed due to the insecticide when applied in the above normal strength on brinjal, jasmine, marigold, radish, *sarson*, wheat, cabbage, kohl rabi and sugar beet.

Chlordan

Chlordan ($C_{10}H_6Cl_8$) was formerly known under the various names of Chlordane, Octoklor, Velsicol, 1068. It is both a stomach and contact poison and serves as a fumigant as well. Duration of its residual effect has been reported to be three weeks. It is compatible with DDT, pyrethrum, Lethane, Thanite, etc. It is more toxic than DDT and should, therefore, be used with care.

This Directorate has experimented with two proprietary products, namely 'Octoklor' and 'Dowklor'.

Availability: The sample of 'Octoklor' was supplied by Messrs. Julius Hyman and Co., Denver, Colorodo, U.S.A. and that of 'Dowklor' by Messrs. Getz (India), Ltd., Bombay.

Pests against which tried: 'Octoklor' was in the form of 74 per cent emulsifiable Chlordan and was used in ratio of 1 : 800 with water (0·094 per cent) on rose plant infested by the red scale (*Aonidiella aurantii*) in July. After a few days it was observed that a degree in the mortality of the pest obtained was high. On subsequent visits it was observed that no second spraying was required in the same season. When tried in concentration of 0·28 per cent against the same pest on roses in the first week of February, it was observed that the pest died completely and the plants were free from infestation.

'Dowklor' was available in the form of 40 per cent emulsifiable grade and tested in the ratio of 1 : 400 with water against white fly (*Bemisia tabaci*) infesting potato, tomato and gooseberry throughout winter of 1949-50, on over two dozen occasions. The problem was not of reducing the damage caused by the adult flies but one of reducing their population to minimum numbers, so that their activity to act as vectors of virus diseases could be checked. Critical

field observations suggest that 80 per cent of the flies die within the first week after spraying. No adult flies are seen in the sprayed plot in the second week. Reinfestation by the flies is again observed in the third week. It gradually increases and necessitates respraying. It has been observed repeatedly that the residual effect of this insecticide does not last longer than a fortnight under field conditions as far as its effect on this species of white fly is concerned.

It may, however, be stated that the insecticide was quite effective against the adult white flies and it has been observed that in several plots where one or two sprayings of 'Dowklor' had been done at the initial stages of whitefly infestation on the young crop, a marked improvement was noticeable in the growth of sprayed crops such as potato, tomato and goosebery and compared to non-sprayed crop the intensity of virus infestation on them was very low.

'Dowklor' at a strength of 0·3 per cent was also tried to exterminate two colonies of black ants (*Camponotus compressus*) which had inhabited the compound of a bungalow in Delhi in the month of December. The diluted emulsion was poured in through the visible exits using about a gallon of the spray. The sprayed ants died immediately. No ants were observed coming out of the colony after 24 hours of the treatment. After three weeks one of the colonies seemed to have perished but in another case a fresh exit was made 2½ yards away from the original.

Phytotoxy : No phytotoxy was observed on any of the plants sprayed with the above dilutions of the insecticide.

Parathion

The active ingredient in parathion is diethyl para-nitrophenyl-thiophosphate ($C_{10}H_{14}NO_5-PS$). It is also known under such trade names as E 605, 3422, Thiophos. It is compatible with DDT, BHC, Toxaphene, rotenone, pyrethrum, sulphur and insoluble coppers, etc. The insecticide is both a stomach and a contact poison and possesses the qualities of being a fumigant, ovicide and systemic insecticide. It is known to be 75 times more toxic than DDT, therefore every care is necessary to avoid hazard to the health of man and animal when sprayed on food crops.

Availability : This Directorate has experimented with Cheminova parathion E, emulsifiable concentrate received from Messrs. Cheminova Maalov, Denmark as a sample. This contained :

O-O diethyl-para-nitrophenyl thiophosphate	..	35 per cent.
fyld-og-spredestoffer	.. ..	65 per cent.

Pests against which tried : The sample was tried in concentration of 0·018 per cent against citrus psylla (*Diaphorina citri*) on malta orange plants in August, 1950, when the pest was very active and all stages of the pest such as eggs, nymphs, and adults were available on its host. The insecticide was found very effective in killing all the stages of the pest when observed after 24 hours of spraying. The tree remained quite free from the infestation of the pest for a fortnight. After the lapse of this period a few of the migrants from the adjoining areas were observed to have settled on the sprayed plants, but they caused minor infestation subsequently. The insecticide in above concentration was also tried against *Parlatoria* scales on jasmine on the same day when citrus psylla was treated. The sprayed scales turned dark brown and were found dead when observed after a week.

Red mites : Parathion, in concentration of 0·018 per cent was tried against red mites infesting marigold flowers and whitefly (*Bemisia tabaci*) infesting tomato during winter. Kill obtained in mites was 98 per cent but after about a fortnight the population of the mites was observed to be on the increase.

In the case of white flies, it was intended to kill the adult white flies so that they are unable to serve as virus vectors. The results of spraying showed that the insecticide killed the flies but its residual effect did not continue longer than a week and therefore infestation by the adult flies from the surrounding areas was unavoidable.

Bean aphis : Cheminova parathion was tried against *Aphis laburni* on bean creeper in January, 1950. There were no pods on the creeper ; the dosage maintained was the same as stated above. As a result of spraying, 95 per cent of the aphids were found dead when they were observed after about 24 hours of the operation.

Phytotoxy : None of the plants, on which the insecticide was tried in dilution of 0·018 per cent showed any injury except the marigold in which case those leaves which had badly faded prior to spraying were observed to dry up. New leaves, however, took their place and the plants which looked sickly before revived in health after a fortnight.

A SHORT REPORT OF PLANT PROTECTION (ENTOMOLOGICAL) WORK IN WEST BENGAL FROM APRIL 1950 TO NOVEMBER 1950 (KHARIF SEASON)

By

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Preamble :

The Plant Protection Scheme in the State of West Bengal is in the third year of its running from 1948. During the year under report it was apprehended that there would be widespread attack of insect pests throughout the State due to the drought condition that was prevailing during the months of April and May. A circular to this effect was issued to the extension staff of the Directorate of Agriculture during the first week of May. In fact, reports of large scale attack of swarming caterpillar on Aus paddy and Aman seed-bed from Baduria and Swarupnagore P.S. were received as early as the first week of June. During this period we also received large number of reports of pest attack on paddy from different parts of West Bengal. Well-equipped Plant Protection units were immediately rushed to the spots and almost in every case the pests were brought under control to the full satisfaction of the local cultivators. One of the main features of control operation, this year, was the extensive use of power dusters. Altogether we used five different types of power driven dusters in different parts of the State.

Machinery and insecticides :

Insecticides and machines were stored either at the Government seed-stores in the offices of the Sub-divisional Agricultural Officers and Agriculture-Inspectors just before the end of Rabi season of the year, in order to avoid the difficulties which have to be faced in carrying the equipments and chemicals to the affected areas during the season of operation.

During this year, 121 hand dusters and 11 power dusters were purchased to supplement the last year's stock. Types and number of power dusters used during last Kharif season were as follows :—

1. Root duster—one	6 H.P.
2. Tornado marvil dusters—three	1½ H.P. each.
3. Pestmaster dusters—two	2½ H.P. each.
4. Allmans twinwheel dusters-three	1/4 H.P. each.
5. Allmans monowheel dusters—two	1/4 H.P. each.

The hand dusters used were : (*a*) Dobbins rotary duster, (*b*) Hudson rotary duster, (*c*) Jacoby Knapsac duster—(*i*) single bellow, (*ii*) double bellow and (*d*) Orient duster.

Insecticides :

The following insecticides were used extensively :—

1. Gammexane GT
2. Hexyclan
3. Hexidole

The strength of the above insecticides were restricted to 5 per cent dust. All the products have been found to be quite satisfactory and equally efficacious against pests of paddy and jute.

Crops treated :

1. Paddy all over the State.
2. Jute all over the State.
3. Vegetable (In hills).

Insect pests controlled :

Paddy—Swarming caterpillar, Rice Ear cutting caterpillar, Rice bug, Rice Hispa, Rice Caseworm, Jassids.

Jute—Jute semi-looper, Jute Hairy caterpillar.

Area of operation :

Paddy.—There were severe attacks of swarming caterpillar in Baduria and Swarupnagore P.S. in the district of 24-Parganas, in Sadar P.S. in Burdwan district, in Joypur P.S. in Howrah district and in Goghat P.S. in Hooghly district. Severe outbreak of ear cutting caterpillar occurred at Patikabari and Kusthia in Nadia district. In all these cases the pest was completely brought under control by the Plant Protection staff before any damage could be done to the standing crop, excepting in Ramnagar Union in Contai sub-division and in Dantan P.S. in Midnapur, Sadar South Sub-division where some damage was caused due to delay in the receipt of the information of the outbreak on account of flood.

In some cases it was found necessary to dust the adjoining aman paddy lands without any crop, on account of the fact that the swarming caterpillars destroying the grasses of these fields may pupate in the soil and cause havoc to

the succeeding aman crop. The total area dusted against the different paddy pests was 26,265 acres. Detailed information has been furnished in statements A and B.

Jute.—Plant Protection work on jute was taken up within the orbit of this section rather very late. A considerable damage had already been caused before the responsibility of the work was transferred to this section. Since then a considerable area had been protected against the attack of Jute pests mainly in the districts of 24-Parganas and Murshidabad. During the entire period about 4,506 acres of jute crop were protected against different pests. Detailed information has been given in statement A.

STATEMENT A

Statement showing areas dusted under Aus paddy, Aman paddy and Jute in different districts in West Bengal.

District	Aus	Aman seed bed	Aman Trans-planted	Aman land without crop	Jute
24-Parganas	5,983	1,213	930	2,942	2,045
Burdwan	..	479	6,269	700	519
Midnapur	240	3	3,259	..	200
Murshidabad	864	..	424	..	1,514
Nadia	240	54	945	..	9
Hooghly	..	19	701	..	94
Howrah	..	8	266	..	75
Birbhum	..	..	412	..	..
Bankura	..	..	259	..	..
Jalpaiguri	..	..	25	..	..
Coochbehar	..	..	..	..	54
Darjeeling	..	..	28	..	..
West Dinajpur	..	..	2	..	..
Malda	..	..	..	..	3
	7,327	1,776	13,520	3,642	4,513

Total area dusted : 30,778 acres.

STATEMENT B

Statement showing acreage of paddy protected against different pests in the districts of West Bengal.

Pests	Area of operation.	Sub-division	District	Area infested (in acres)	Acreage covered
Swarming caterpillar 20,944 acres.	Baduria Swarupnagar	Basirhat	24-Parganas	6,298*	9,240*
	Harba, Nongaon	Barasot	24-Parganas	960	960
	Danton, Belda	Nidnapur (s)	Midnapur	2,976	976
	Egra, Ramnagar	Contail	Midnapur	465	465
	Cibiballav	Jhargram	Midnapur	130	130
	Jhargram Ghatal	Ghatal	Do.	298	298
	Keshpur	Midnapur (N)	Do.	407	407
	Salboni		Do.		
	Godapessal		Do.		
	Tamluk	Tamluk	Do.	4,105	335
	Burdwan	Burdwan	Burdwan	5,493*	6,193*
	Kalna, Ketwa	Kalna, Katwa	Do.	553	553
	Godat, Khanakul Arambagh.	Arambagh	Hooghly	558	558
	Polba	Hooghly	Do.	9	9
	Arambagh Serampur	Serampur	Do.	28	28
	Amta, Jagatballavpur	Howrah Uluberia.	Howrah	223	223
	Rampurhat	Rampurhat	Birbhum	412	412
	Ranaghat, Santipur	Ranaghat	Nadia	33	33
	Krishnagar	Krishnagar	Nadia	294	294
	Lalbagh	Lalbagh	Murshidabad	2	2
	Kalimpong	Kalimpong	Darjeeling	28	28

* These particular two cases represented the area covered in connection with the control of Swarming caterpillar. In Basirhat Sub-division Swarming caterpillar appeared in the Aus crop while preparation for the next Aman crop was in progress. Aman seed beds were also attacked. These plots have been taken under acreage infested. But lands at that time lying fallow which were meant for becoming the area to be transplanted with Aman seedlings were also dusted as a preventive measure against swarming caterpillars in future. These figures have been taken in the "area covered". A few insects were actually seen on the grass in these fields at the time of dusting. If precautionary measures had not been taken, the whole Aman crop would have been destroyed by this pest.

In Burdwan also, the area still to be transplanted with Aman seedlings was dusted with insecticide. Thus, the area covered has actually become more than the area infested.

Pest	Area of operation.	Sub-division	District	Area infested (in acres)	Acreage covered
Rice hispa 3,063 acres	Swarumnagar	Basirha	24-Parganas	261	261
	Habra, Bongaon	Baraset	Do.	607	607
	Burdwan	Burdwan	Burdwan	605	605
	Berhampur	Berhampur	Murshidabad	1,246	1,246
	Kandi	Kandi	Do.	40	40
	Jagatballavpur	Howrah-Ulberia	Howrah	51	51
	Hooghly	Hooghly Sadar	Hooghly	180	180
	Serampur	Serampur	Do.	4	4
	Ranaghat	Ranaghat	Nadia	5	5
	Alipurduar	Alipur	Jalpaiguri	13	13
	West Dinajpur	West-Dinjapur.	W. Dinajpur	2	2
	Midnapur (S)	Midnapur	Midnapur	28	28
	Contai	Midnapur	Midnapur	21	21
Jassids 645 acres	Ghatal	Arambagh	Hooghly	141	141
	Keshpur	Midnapur (N)	Midnapur	270	270
	Keshiari	Midnapur (S)	Midnapur	194	194
	Gidni	Jhargram	Midnapur	15	15
	Katwa, Kalna	Katwa Kalna	Burdwan	20	20
	Taldanga	Bankura	Bankura	5	5
Rice Bug	Asansol	Asansol	Burdwan	57	57
172 acres	Contai	Contai	Midnapur	115	115
Earcutting caterpillar 74 acres	Nakashipara Tehatta	Krishnapur	Nadia	874	874
Rice grasshopper	Nakashipara	Krishnapur	Nadia	33	33
	Alipurduar	Alipurduar	Jalpaiguri	12	12
150 acres	Contai	Contai	Midnapur	105	105
Rice caseworm 87 acres	Gidni	Jhargram	Midnapur	43	43
	Bankura	Bankura	Bankura	44	44
Paddy leaf roller 303 acres	Keshpur	Midnapur	Midnapur	100	100
	Bankura	Bankura	Bankura	210	210
	Katwa	Kalna-Katwa	Burdwan	20	20

STATEMENT C

The economics of pest control operation on paddy in the state of West Bengal during the Kharif Season of 1960 may be easily studied from the Statement given below :

Pest	Area covered in acres	Average yield per acre in mds.	Price per maund of paddy	Percentage of damage recovered	Gross savings in tons	Gross savings in cash	Insecticides used in tons @ 10 lb per acre on average.
I	II	III	IV	V	VI	VII	VIII
		mds.	Rs.	per cent	Rs.	Rs.	
1. Swarming caterpillar	20,944	18	7 8 0	100	13,962·2	28,27,440·00	93·5*
2. Rice Hispa ..	3,063	Do.	Do.	5	102·0	20,65,525·00	13·4
3. Earcutting caterpillar	874	Do.	Do.	70	408·1	82,593·00	0·4
4. Jassid ..	645	Do.	Do.	5	21·5	4,353·75	0·3
5. Leaf Roller ..	330	Do.	Do.	5	11·0	2,227·50	0·15
6. Rice bug ..	172	Do.	Do.	5	5·72	1,161·00	0·08
7. Rice grass-hopper ..	150	Do.	Do.	5	5·0	1,012·50	0·07
8. Rice caseworm ..	87	Do.	Do.	5	2·9	587·25	0·04
	26,265				14518·43	29,40,030·25 i. e. Rs. 29,40,030—1—0	108·24

Cost of insecticides	Contingent expenditure	Labour expenditure	Total expenditure	Net saving	Average gross saving per acre in cash	Cost of operation per acre	Average net saving per acre in cash
IX	X	XI	XII	XIII	XIV	XV	XVI
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
44,880	..	..	..	..	..	..	..
6,563·8	..	..	..	..	..	..	..
187·3	..	..	..	..	..	..	..
138·2	..	..	..	..	..	..	..
70·7	..	..	..	..	..	..	..
36·9	..	..	..	..	..	..	..
32·1	..	..	..	..	..	..	..
18·6	..	..	..	..	..	..	..
51,935·6 i.e. Rs. 51,935 10 0	2,100	2,900	57,935 10 0	28,82,094 10 0	111 15 1	2 3 4	109 11 9

* In the early stage swarming caterpillars could be controlled with dusting of insecticide at the rate of 7-8 lb. per acre while in some cases 10 lb. insecticides per acre were required and occasionally adjoining areas required only light dressing.

INCIDENCE OF IMPORTANT DISEASES IN SOME OF THE IMPORTANT ECONOMIC CROPS AT THE INDIAN AGRICULTURAL INSTITUTE AND ITS SUB-STATION AT KARNAL DURING 1950-51.

BY

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The crops grown at the Indian Agricultural Research Institute and its Sub-Station at Karnal are surveyed for diseases frequently throughout the season. The incidence of a few major crop diseases as observed during 1950-51 in the important foodgrain crops is given below :

Wheat

Loose Smut (*Ustilago tritici*) was observed as stray cases in most of the wheat plots at the Indian Agricultural Research Institute Farm. The infection ranged from 0·1 to 2 per cent., being highest in the variety C. 518, like last year. The various varieties grown are N. P. 4, N. P. 52, N. P. 80-5, N. P. 165, N. P. 710, N. P. 715, N. P. 718, N. P. 760, N. P. 771, N. P. 775, C. 13, C. 217, C. 228, C. 518 and C. 591. Generally speaking, the loose smut infection this year in the Indian Agricultural Research Institute Farm crop was more widespread than last year. In the Botany Division, loose smut infection was found in traces only in three varieties (N. P. 720, C. 591 and M. H. 431) out of about 30 grown in yield trial and seed multiplication plots.

At Karnal, the disease was found in traces only in C. 518, C. 591, N. P. 4, N. P. 52, N. P. 80-5, N. P. 165, N. P. 710 and N. P. 775.

Flag Smut (*Urocystis tritici*) was found only as sporadic cases at Delhi. The 5-acre plot which showed heavy Flag Smut infection last year (5-15) per cent) was not under wheat this season. At Karnal, in a 7·5 acre block of C. 518 the Flag Smut infection of 10 per cent was observed. The infection last year in this very plot was 3-4 per cent in C. 518 and N.P. 52, and the year before 2-3 per cent; thus indicating the role of soil infection and the accumulation of the disease in the affected plots. No Flag Smut was, however, observed this year in any of the other wheat varieties grown including N. P. 52 which had shown 3-4 per cent infection last year.

Rust.—On the whole it was a year of very mild rust infection, so far as Delhi is concerned. All the three rusts appeared later than usual and failed to develop much owing to the comparatively dry weather that prevailed after their appearance. A few showers of rain during the months of March and April resulted in the rust development in later stages only affecting chiefly the late tillers and a few remaining green leaves of late varieties. At Karnal, however, the rust infection was moderate.

Yellow rust was practically absent this year at Delhi. Of the 22 varieties grown 17 showed no infection. In the remaining 5 the intensity of infection was observed to be negligible in N. P. 710 ; negligible to very light in C. 518 ; light in N. P. 52 and N. P. 764 ; and moderate in N.P. 758. The rust appeared at Delhi on 1-2-51.

At Karnal very heavy infection was observed in N. P. 52, N. P. 758 and N.P. 764. N. P. 762 showed light to heavy infection in different plots. In N.P. 710, N. P. 715, N. P. 718, N. P. 775, C. 518 and C. 591 the infection was traces to light in N. P. 720 ; whereas N. P. 4, N. P. 80-5, N. P. 165, N. P. 737 and N. P. 760 remained free from yellow rust infection.

Brown rust attack was very light this year at Delhi. The rust made its appearance on 20th February 1951 but failed to develop to any appreciable extent. The intensity of infection was negligible to traces on N. P. 710, N.P. 715, N. P. 718, N. P. 720, N. P. 737, N. P. 760, N. P. 761, N. P. 775, N. P. 4, N. P. 80-5, N. P. 165 and C. 591. It was traces to light in C. 13, C. 217, C. 228 N. P. 52, and light to moderate in C. 518. The varieties N. P. 745, N. P. 758, N. P. 762 and N. P. 764 remained entirely free from Brown rust infection.

At Karnal the infection varied from traces to heavy in different varieties. In N. P. 710, N. P. 737 and N. P. 761 the infection was in traces only ; N. P. 52, N. P. 80-5, N. P. 165 and N. P. 745 showed traces to light infection ; N. P. 715, N. P. 718, N. P. 720 and N. P. 760 had traces to moderate infection ; their infection was light to moderate in N.P. 4 ; moderate to heavy in N. P. 775 and C. 518 ; and heavy in C. 591, particularly in the lodged crop. No Brown rust infection was observed in N. P. 758, N. P. 762 and N. P. 764.

Black rust attack was very mild this year both at Delhi and Karnal. Most of the varieties showed infection in traces only. N.P. 4, N.P. 80-5, N. P. 165, N.P. 720, N. P. 768, C. 518 and C. 591 showed comparatively greater infection.

At Delhi the rust made its appearance on 17th March 1951 and the infection was in traces to very light in N. P. 710, N. P. 718, N. P. 726, N.P. 745, N. P. 758, N. P. 760, N. P. 761, N. P. 762, N. P. 764, N. P. 771 and N.P. 775 ; traces to light in N. P. 715, N.P. 737, C. 13, C. 217, C. 228, C. 518 and C. 591 ; light in N. P. 4, N. P. 720 and N. P. 768 ; and light to moderate in N. P. 52, N. P. 80-5 and N. P. 165.

At Karnal the infection was in traces in N. P. 710, N. P. 715, N. P. 737, N. P. 758, N. P. 761 and N. P. 764 ; traces to light in N. P. 718, N. P. 760, N.P. 762, N. P. 775, N. P. 165 and C. 518 ; light in N. P. 4 ; light to moderate in N.P. 720 and N. P. 745 ; and moderate to heavy in N. P. 80-5.

Karnal Bunt and Septoria Leaf-spot were absent, like last year, both at Delhi and Karnal.

Helminthosporium leaf-spot infection was observed in traces only at Delhi.

Barley

Covered Smut (*Ustilago hordei*) infection in traces only was observed both at Delhi and Karnal in N. P. 13, the only variety grown at both the places. No infection of **Loose Smut** (*Ustilago nuda*) was observed this year in the barley crop at either place.

Rust. There was only a very light attack of both the Yellow and the Black rust of barley this year at Delhi. The rusts appeared late in the season and failed

to spread owing to dry weather that prevailed this year during January and February. Infection in most of the plots was in traces or traces to light only. One late sown plot of barley (variety "local") in the Mycology Division, however, showed moderately heavy Yellow rust infection.

A light infection of *Helminthosporium* leaf spot was also observed at Delhi.

Oats

Smut. The entire crop of oats both at Delhi and Karnal remained free from Covered Smut or Loose Smut infection.

Leaf Spot (*Helminthosporium avenae*) infection of light intensity was observed in the oat crop at Delhi. Variety N.P. 2 showed comparatively greater infection. N. P. Hybrids 1 and 3 showed infection in traces only. At Karnal the late crop showed moderately heavy infection.

Gram

Wilt (*Fusarium orthoceras*) incidence in the main Crop consisting of N. P. 58 varied from 2 to 10 per cent in different plots at Delhi, whereas in varieties N. P. 17, N. P. 25, N. P. 28 and N. P. 83 the disease was observed to occur in traces only.

At Karnal, the gram crop in certain plots of light soil showed severe wilt infection in N. P. 58, the only variety grown, while the wilt incidence in the heavier clayey soil plots was negligible.

Rust (*Uromyces ciceris-arietini*) was absent this year both at Delhi and Karnal.

Peas

Powdery Mildew (*Erysiphe polygoni*) appeared rather late at Delhi and progressed very slowly owing to dry weather conditions. By the end of the season, however, several plots of Peas (N. P. 29) showed 50-100 per cent disease incidence but the intensity of infection was only light and there was little perithecial formation.

Rust (*Uromyces fabae*) was absent this year both at Delhi and Karnal in peas crop.

Wilt (*Fusarium oxysporum* f. *pisi*) was observed as solitary cases in the crop at Delhi.

Maize

Downy Mildew (*Sclerospora philippinensis*) infection in the maize crop varied from 1-2 per cent in the various plots at the Indian Agricultural Research Institute Farm and like last year, gave clear indications of secondary infection. The disease was brought under control by spraying the crop with Bordeaux Mixture.

Fungicidal Seed Treatment

The relative efficacy of seed treatment with four important common seed-dressing fungicides on maize crop (variety yellow N. P. 2) was tested. Seed treatment with Agrosan GN, Barbak, Spergon and Copper Carbonate gave statistically significant increase in emergence, stand and growth vigour. Increased yields were also obtained in the case of three fungicides.

Similar experiments have been conducted with wheat (N.P. 715) and barley (Local variety) also during the 1950-51 Rabi season but the yield data are not yet to hand.

CONTROL OF SLUGS, SNAILS AND CRABS BY METALDEHYDE*

Preliminary trials carried out by the Madras and Bombay Departments of Agriculture at the suggestion of the Indian Council of Agricultural Research proved that Metaldehyde was effective in the control of slugs, snails and crabs.

Slugs (*Vaginulus* sp.) frequent damp places and bury themselves in earth during day time. They come out during nights and nibble the tender parts of plants like betel leaves and Agathi leaves. *Davanum*, Brinjal, tomato, chilli, cabbage and cauliflower are also damaged by them. In Madras State, control trials were conducted in the village Ayyavari Rudravarum in Krishna District. A shallow trench of 3 inch deep and 9 inch wide was made round a vegetable plot into which the slugs were reported to have moved during nights from the neighbouring shrubby shelters and caused damage to the crops. Metaldehyde at 2 per cent in rice bran thoroughly mixed was applied to the trench in the evening when the soil was moist. The slugs were found coming to the trench, eating the poisoned bran and dying in numbers either in the trench itself or 2 or 3 ft. away from the baited belt and hundreds could be seen dead next day. This 2 per cent poisoned bran was quite fatal to young and adult slugs with the only difference that the young ones succumbed to the bait sooner than the adults which showed nervousness and profuse excretion of slime. The victims were incapable of movement and laid in morbid condition till life was extinct. The treated plot remained free from slugs and the effect continued for a week. The same results were obtained when fried bran was substituted for raw bran in the above experiment.

Metaldehyde baiting trials conducted against snails at Atkur village and Gannavaram Taluk in Krishna Dt. were also quite successful in controlling them. Metaldehyde was mixed with rice bran at one ounce per 3 lb. roughly working out to two per cent was kept in lumps on field bunds. It was found that the snails near about the bait gathered at it, took it in and were dead by the next morning. For each lump so kept, 15 snails on an average were found dead.

Trial conducted by Bombay Government against crabs in a rice field near Poona showed that Metaldehyde was lethal to crabs.

Metaldehyde baits were prepared by mixing one part of the chemical with 16 parts of wheat flour and three parts of jaggery and water just sufficient to moisten them. Before baiting the burrows with living crabs were ascertained by closing the burrows with mud on the previous day and examining them on the next day. Only those burrows which were found open on the next day were considered as having crabs and were treated. The baits were prepared in the form of balls according to the size of the burrow and were put inside the burrows which were subsequently closed with mud. Counts were taken of the (i) number of burrows under observation and (ii) number of opened burrows during next three days. The number of opened burrows gives the number of crabs that escaped death. The control experiments reveal that there was natural death among crabs to an extent of 37·9 per cent whereas death due to treatment with Metaldehyde was 56·8 per cent giving an excess of 18·9 per cent death. As only a single trial was carried out, no valid conclusions could be made with regard to the success of metaldehyde against crabs.

* Extracted from Reports received by the Indian Council of Agricultural Research from the Departments of Agriculture, Madras and Bombay.

"KOLEROGA" OR "MAHALI" DISEASE OF ARECANUTS

By D. MARUDARAJAN

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Introduction.—Arecanut is a crop of great economic importance in the West Coast districts of the State of Madras. It provides occupation and means of livelihood to thousands of poor people in the tract. The crop occupies an area of one hundred thousand acres in the Malabar and South Kanara districts put together. In these two districts, the crop is seriously affected by a fungus disease causing fruit rot. The disease is known as "Mahali" in Malayalam and "Koleroga" in Kannada. The incidence of this disease in certain years has resulted in heavy losses to the cultivators.

The disease first attracted the attention of a former Mysore Mycologist, Dr. L. C. Coleman. He carried out investigations and published his results in the form of a bulletin in the year 1910*. It was shown that the disease could be effectively controlled by the application of Bordeaux mixture to the growing bunches in the fruiting season. Subsequently, the problem has been the subject of study by successive Mycologists of the State of Madras and the Plant Pathologist in Bombay.

Work in Madras.—In the earlier years, work was confined to field observations and to popularising the spraying of Bordeaux mixture which has been known to effectively control the disease. The several aspects of the disease such as symptoms, the time of incidence, the intensity of infection, etc., were studied. The following description of the disease is recorded. The disease appears during the South-West monsoon in June-July and persists till about October. The heaviest losses to the crop have been known to occur in the month of July and August. The commonest symptom of the disease is the rotting and shedding of immature nuts. The infected nut shows a patch of water soaked appearance on the surface. Later, a spongy growth of white mycelium develops. When cut open, the internal tissue will be found discoloured and the kernel rotten. In advanced stages of infection, the stalks of the fruits and bunches are also affected. The occurrence of bud rot resulting in the death of the palm is another manifestation of the disease. But rot generally appears from November onwards and becomes more and more evident in the succeeding dry months.

The application of Bordeaux mixture was known to be an effective control measure. The use of stickers and spreaders, like resin, casein, vegetable oils, etc., with Bordeaux mixture was thought to be necessary in the heavy rainfall areas of the West Coast and these were being recommended by the Department. But until recently precise data were lacking regarding the strength of the spray fluid used, the number of sprayings required, the merits of the several stickers and spreaders used with Bordeaux mixture. etc. Field experiments were, therefore, carried out for a number of years to obtain precise information on the above aspects.

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*Coleman, L. C.—Mycological series, Bulletin No. 2, Department of Agriculture, Mysore State. 1910.

The first series of experiments showed that plain Bordeaux Mixture (i.e. Bordeaux mixture prepared without using any adhesive) was as effective in controlling the disease as Bordeaux mixture to which the adhesives were added and the use of resin as an adhesive to Bordeaux mixture made the mixture less effective.* These results were important because they showed the possibilities of breaking an established practice of using resin Bordeaux mixture for 'Mahali' control which owing to its prolonged usage through several years had acquired a popularity among the cultivators. The finding that adhesives which were invariably a source of additional expenditure and labour, were unnecessary was of far reaching importance to the areca growers in the 'mahali' infected tract.

In order to get confirmatory results, more detailed experiments were conducted in Mundaji, a village situated in the 'Malnad' of the South Kanara district where the disease has been consistently reported to have been causing serious damage to the crop. The rainfall in this area ranges from 200 to 240 inches per year. The Mundaji experiments were carried out with the following objects :

(1) To test the efficacy of plain Bordeaux mixture in comparison with Bordeaux mixture to which adhesives were added.

(2) To find out whether 1 per cent plain Bordeaux mixture, the cost of preparation of which is only a third of that of 2 per cent resin Bordeaux mixture, would effectively control the disease in a heavy rainfall area like Mundaji and the number of sprayings which would result in optimum efficiency.

(3) To compare the efficacy of the 'Jet' method of spraying which is in vogue in South Kanara with the 'mist' spraying usually adopted in Malabar and Mysore.† These experiments established beyond doubt, (1) that the addition of adhesive to Bordeaux mixture was unnecessary, (2) that two sprayings with 1 per cent Bordeaux mixture, one given just prior to the outbreak of the monsoon and another about six weeks later were quite enough to control the disease, (3) the 'jet' method of spraying compared equally with 'mist' spray in controlling the disease.

Extension Service.—Trial and demonstration plots were laid out in Malabar as early as in 1910 to popularise the spraying operations among the areca growers. The same line of work was pursued in South Kanara some years later. The department issued leaflets and press notes from time to time giving information on the correct method of preparation and application of Bordeaux mixture. In the year 1937, following the outbreak of 'Koleroga' in a serious form in the previous season, a special staff was appointed to carry out spraying demonstration and to render all assistance to cultivators in South Kanara in the matter of securing sprayers and chemicals. At present there is a plant protection staff working in the Districts who assist the ryots in carrying out the control measures.

* K. M. Thomas and D. Marudarajan. Some aspects of the control of 'Koleroga' or 'Mahali' disease of the areca palm—The Mad. Agri. Jour, Vol. XXV, Nov. 1938.

†D. Marudarajan and S. Kalyanasubramaniam. The use of plain Bordeaux mixture for the successful control of fruit rot of arecanuts—Madras Agricultural Journal, Vol. XXXV, August 1948.

DISEASE OCCURRENCE IN INDIA

LINSEED RUST IN ASSAM.

By S. CHOWDHURY(1)

Linseed (*Linum usitatissimum* L.) is commonly grown in the comparatively less fertile tracts of Assam wherefrom it is not possible to reap a good crop of mustard. Linseed is not, therefore, an important oilseed in this State but in certain areas its extensive cultivation is not rare. Observations carried out during the last three growing seasons have shown that this crop is not susceptible to any other disease except rust (*Melampsora lini* (Pers.) Lev.) All the local types have been found equally susceptible to this disease. Survey so far made has shown that this disease appears during the later part of February in Cachar and during the first week or middle of March in Upper Assam. In Lower Assam it has been noticed to appear during the later part of February or early March. In 1949, the disease, however, appeared as late as the first week of April in Upper Assam in the late sown crop. No epiphytotics occurred during the years 1949, 1950 and 1951. A mild incidence of the disease was noticed and it caused very slight damage.

During the last two years the respective resistance of a number of types of linseed obtained from the Indian Agricultural Research Institute, New Delhi and collected locally was tested. Types R. R. 5, R. R. 9, R. R. 10, R. R. 37, R. R. 38, R. R. 39, R. R. 40, R. R. 45, R. R 62, R. R. 63, R. R. 67, R. R. 68, R. R. 76, R. R. 78, R. R. 80, R. R. 82, R. R. 122, R. R. 187, R. R. 197, R. R. 199, R. R. 200, R. R 201, R. R. 202, R. R. 204, R. R. 236, R. R. 239, R. R. 240, R. R. 260, T. T. 261, R. R. 262, R. R. 267, R. R. 272, R. R. 328, R. R. 69 and R. R. 99 obtained from the Indian Agricultural Research Institute remained absolutely free from the rust while N. P. 21 also obtained from the Indian Agricultural Research Institute and the local types collected from Cachar, Nowgong and Sibsagar, suffered from the disease. N. P. 21 was, however, more severely affected and showed 100 per cent infection while the local types showed 10 to 50 per cent infection.

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PLANT DISEASES IN PUNJAB (I) DURING 1950-51*

The incidence of diseases in Punjab, crop-wise, is given below :—

Wheat

The wheat crop in this state remained free from the attack of rusts, as the weather during the season was unfavourable for the development of the disease. Loose smut (*Ustilago tritici*) was noticed throughout the State and in particular in Gurdaspur, Ferozepur, Jullundur and Ambala districts. In Gurdaspur the incidence of the disease was 10 per cent, in Ferozepur 5-7 per cent and in Jullundur and Ambala 2-5 per cent.

The stinking smut (*Tilletia tritici*) was observed in Kangra (Kulu) ; about 8-10 per cent plants were infected. In Gurdaspur and Ambala, the crop was also affected by flag smut (*Urocystis tritici*) to the extent of 0·5-1 per cent.

Barley

This crop was affected by covered smut (*Ustilago hordei*) in the Gurgaon district. The incidence of the disease was 2 per cent.

Gram

Gram blight (*Mycosphaerella rabiei*) was noticed in Gurdaspur with an incidence of about 1 per cent. It was, so far, almost absent in Punjab (I) and seems to have been introduced from the Sialkot side in Pakistan. Gram wilt (a disease of the Barani crop) was noticed in Ambala, Gurdaspur, Ferozepur and Hissar districts with an incidence of 10-15 per cent in Ambala, 4-8 per cent in Gurdaspur and 1 per cent in Ferozepur and Hissar districts.

Jowar

The jowar crop suffered all over the state, from the Red leaf spot *Colletotrichum graminicolum* ; the incidence of the disease in Ambala was 8-10 per cent and in Karnal it was 4-8 per cent.

Bajra

The green ear disease (*Sclerospora graminicola*) was reported from all the Bajra growing districts and appears to be on the increase in Punjab (I) State. The incidence of the disease was 8-12 per cent in Ferozepur; 5-8 per cent in Hissar ; 4 per cent in Gurgaon and 2 per cent in Rohtak and Karnal.

Paddy

The paddy crop in Gurdaspur, Ambala and Karnal suffered from stem rot (*Sclerotium oryzae*) ; the percentage incidence of the disease was 5 in Gurdaspur and Ambala and 2 in Karnal.

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* Note prepared from a tabular statement by the Asstt. Plant Pathologist, Ferozepur Cantt. and forwarded for publication by the Director of Agriculture, Punjab (I).

Cotton

In (Abohar) Ferozepur the cotton crop suffered from root rot to the extent of 1-2 per cent.

Ground Nut

This crop was attacked by 'Tikka disease' (*Cercospora personata*) in Ludhiana district with an incidence of about 10 per cent.

Citrus

Citrus was affected with Canker and wither tip in all the citrus growing districts ; the incidence of the disease was 2-5 per cent. Apple fruits were affected with Scab and brown rot in the Kangra district (Kulu valley) to the extent of 5 per cent.

SHORT NOTE ON WHEAT RUST AND DISEASES ON OTHER CROPS IN HYDERABAD STATE.

By SYED VAHEEDUDDIN*

Annual wheat acreage in the state of Hyderabad on an average for the last ten years has been 6,28,960 acres. Total area under wheat in this state during the year 1949-50 was 3,83,759 acres and the total output was 42,338 tons The important districts, where wheat is largely grown, are Aurangabad, Bid, Parbhani, Nanded, Osmanabad and parts of Nizamabad, Hyderabad, Gulbarga and Raichur districts. The first five districts are situated in the North-west regions of the State and are commonly known as Marhatwada districts. Wheat is the important food crop of the people of those districts ; otherwise in order are Jowar and Cotton. Soils (which are predominantly black) and other climatic conditions are favourable for a healthy growth of the wheat crop, under dry conditions. As there are hardly any major sources of irrigation most of the wheat is grown under dry conditions.

The most important and serious disease noted on wheat in this state is black stem rust, caused by the fungus *Puccinia graminis* Var. *tritici* which is of common occurrence outside the State also.

During the phytopathological survey conducted by the Plant Pathological Section, Himayetsagar, in 1944-46 and a special wheat survey conducted for a period of 4 months every year for 2 years under a temporary short scheme financed by I. C. A. R., it was noted that time of outbreak of the disease was some where in the months of November to January every year. Recently, the first appearance of this rust has been noted in the month of February also, which clearly indicates that the first appearance is governed by temperature, humidity and other climatic factors in that particular year. As mentioned above, this disease causes very heavy damage sometimes up to 100 per cent, especially when it appears in epiphytotic form, once in two or three years depending on the climatic factors in that particular year. It is estimated that the total damage caused

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by this disease amounts to nearly Rs. 3-4 lacs, when the disease appears in epiphytotic form. Symptoms of the disease are common as in other rusts. In the early stages, the rust pustules bearing uredosori appear on leaf surface and they very rapidly spread on the entire leaf surface giving an appearance of deep brown colour, if the climatic conditions are favourable for the spread of the disease. This stage is called the uredial stage of the disease. A second stage called the telial stage, sets in, when the crop is sufficiently old and in this stage the pustules, bearing the telia and black in colour, appear on the leaf. These pustules appear on the stem region of the plant also, both in the uredial and telial stages of the disease. Maximum damage to the crop is caused, when the rust appears on the stem and leaves, prior to flowering, resulting in no grain formation in the mature ears. A few grains, which may be available from a heavily infested crop are usually small, shrivelled and have less food value, when compared to those from healthy crop.

In 1951 black stem rust on wheat was noticed only in following places namely Main Farm, Himayetsagar, Nagar, Karnool Taluqa of Mahboobnagar district and Jintur Taluqa of Parbhani district. It was first noticed on first February, 1951 at Main Farm, Himayetsagar (Hyderabad district). Reports from other places show that there was no appearance of rust on wheat anywhere in the State excepting the three mentioned above. Due to the late appearance and less intensity of rust, this year, there was no significant damage caused to the crop.

The other important diseases noted this year, on other crops in this state, are as follows :—

1. Grain smut of Jowar (*Spacelotheca sorghi*); to control this, sulphur packets were distributed to ryots for treatment of seed to cover an area of 261,280 acres in Kharif and 496,960 acres in rabi seasons respectively.
2. Blast of paddy (*Piricularia oryzae*)—Hyderabad, Mahboobnagar districts.
3. Helminthosporium leaf spot (*Helminthosporium oryzae*).
4. Striga (*Phanerogamic parasite*) on sugarcane—Nanded district.
5. Wilt of cluster beans and tomato (*Fusarium* sp.)—Nanded district.
6. Mosaic on Bhindi (virus)—Mahboobnagar, Medak, Nanded districts.
7. Turmeric leaf spot (*Taphrina maculans*)—Nanded district.
8. Citrus dieback (*Physiologic*)—Adilabad, Warangal, Mahboobnagar Districts.
9. Citrus canker (*Phytomonas citri*)—Warangal district.
10. Frenching of citrus (Zinc deficiency)—Mahboobnagar District.

IMPORTATION OF PLANTS FROM ABROAD BY AIR INTO INDIA

Importation of plants and planting material (such as bulbs, tubers, cuttings, roots, leaves, buds, layers, scions, rhizomes, stolons, corms, grafts, vines, slips, etc.) into India *by air* is strictly prohibited under the Destructive Insects and Pests Act of 1914 and the Rules made thereunder by the Government of India. A number of cases of such import have, however, come to the notice of the Government, apparently due to the lack of precise information by the public. The Customs authorities at the air-ports have strict instructions to seize and destroy all such materials coming by air. The entry of even flowers or fruits by air is strictly prohibited. There is no ban on import of seed by air provided the consignments are accompanied by certificates of health, certifying freedom from disease carrying organisms and pests ; an exception is made in the case of seed of cotton, flax, berseem and Mexican jumping beans (*Sebastiania palmeri*) of the import of which by air from any part of the world is strictly prohibited. Importation of sun-flower seed from Argentine or Peru is also strictly banned. Persons desiring to import plants and planting material by air from abroad may, however, consult the Plant Protection Adviser to the Govt. of India, Ministry of Food and Agriculture, New Delhi, for advice in the matter.

In this connection, it may also be stated that transit of plants through India by air is permitted only if they are accompanied by official certificate of health for freedom from pests and diseases, granted by authorized officers of the Department of Agriculture of the country of origin and the plants or planting materials are packed in containers which will not permit insects reaching or leaving the plant material and which are not to be opened in any part of India.

NOTES AND NEWS

Some plant responses to certain insecticides in the soil *

Agricultural chemicals that are to be applied to crops or soils year after year should be either non-toxic to plants when mixed in the soil or non-accumulative in the soil.

Persistent toxic substances that will accumulate in the soil upon repeated use at short intervals should be replaced by non-persistent or non-toxic substances.

Pending the development of more definite information on the accumulative effects of various new agricultural chemicals under practical field use, such chemicals should be used only when others are known to be ineffective. Dosages and frequency of application should be kept strictly to the minimum recommended by competent specialists. Improvising, improper use and excessive use by growers are to be firmly discouraged because they often cause serious losses.

Heavy annual use of DDT, technical BHC, and probably other persistent chlorinated hydrocarbons appears to have definite danger of reducing within a comparatively few years the productivity of soils to which they are applied.

Research workers, in both public and private organizations, should investigate the accumulative effects of the new agricultural chemicals as extensively as possible in the immediate future to determine safe limits of use on the different soils for various crops in the several States. It is especially important that these studies be made in order to insure against the use of any persistent substance to the extent that it causes a reduction in soil productivity.

It is similarly important to determine which new substances can be used indefinitely with little or no danger of accumulating harmful residues. The use of valuable and safe substances should be encouraged. The commercial production of such substances should be increased to permit an orderly replacement of persistent toxic substances before trouble is encountered from too long continued use of the latter.

USDA approves dieldrin†

Dieldrin, the newest cotton insecticide has been approved for use in 1951 by the USDA in its Conference Report on Cotton Insect Research and Control.

The USDA conference report states : "Dieldrin was used experimentally for cotton insect control in many locations throughout the Cotton Belt in 1950. It was effective against the boll weevil when applied at the rate of 0·15 to 0·4 pound per acre. It was effective against thrips, the cotton fleahopper, the tarnished plant bug, the rapid plant bug, the fall armyworm, grasshoppers and the variegated cutworm when applied at dosages of 0·05 to 0·15 pound per acre. It was not effective at low dosages for bollworm control and DDT should be added when control of this insect is necessary. Dieldrin will kill newly hatched cotton leafworms at dosages effective against the boll weevil.

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* Extract from "Some Plant Responses to Certain Insecticides in the Soil", by A. C. Foster, U. S. D. A. Circular No. 862, 1951.

†Extract from "Agricultural Chemicals" Vol. VI, No. 4, April, p. 82A. 1951,

" Large-scale field experiments, small-scale field tests and field and laboratory cage tests all indicate that Dieldrin is a highly effective insecticide for controlling many of the injurious cotton insects. It is effective either as a dust or a spray. Dieldrin is suggested for use in the control of cotton insects only where persons associated with its application and use are aware of the hazards involved and are supervised by individuals who are in a position to assume full responsibility and enforce the observance of precautionary measures prescribed by the manufacturers".

Methyl bromide fumigation of balled nursery plants†

A dosage schedule for quarantine use was developed for vacuum fumigation with methyl bromide of balled and burlapped nursery stock having larvae of white-fringed beetles, *Graphognathus* (*Pantomorus*)spp. Dosages for control range from 6 lb. for 1000 cu. ft. at 40° F. to 2 lb. for 1000 cu. ft. and 80° F., with 90 min. exposure. Most broadleaved evergreens tolerated the dosages, but coniferous evergreens were liable to injury.

Chemical methods of soil sterilization*

Various damping off diseases of seedlings caused by *Pythium*, *Rhizoctonia* or *Phytophthora* spp., wilts caused by *Fusarium*, *Verticillium* or *Sclerotinia* spp., and nematode diseases can be controlled by soil sterilization. The chemical methods of soil sterilization are given below :

(1) *Application of formalin*

A solution of commercial formalin in water (1 part of formalin : 49 parts of water) is applied to moist loose soil at the rate of 1 gallon per square foot. The soil is then watered heavily and is kept covered for two days. When dry enough the soil should be worked with implements to allow the formaldehyde gas to escape. Plants or seeds may be set in disinfected soil after 10-14 days when no smell of formalin can be detected.

(2) *Watering with Cheshunt mixture* :

This compound is prepared by mixing finely powdered copper sulphate and fresh ammonium carbonate in the proportion of 2 oz. of the former to 1 oz. of the latter. The dry mixture is stored for 24 hours and is then prepared for use by dissolving 1 oz. of the dry mixture in a little hot water and adding two gallons of water. It is effective against fungal wilts caused by *Fusarium*, *Verticillium*, *Phytophthora* and *Sclerotinia* spp., which may live for long periods in the soil in the absence of susceptible plants.

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†G. R. Swank and R. Latta, J. Econ. Ent., 43 (1) : 25-9, 1950.

*Summary of an article on Soil Sterilization by R. H. Taylor from the Journal of the Department of Agriculture, Australia, Vol. 49, part 5, pp. 223-228 and 231, 1951.

(3) *Soil injection with soil fumigants.*

Injection into the soil of Chloropicrin or D.D. (a commercial preparation consisting of 33 per cent dichloropropane and 63 per cent dichloropropylene and about 5 per cent higher boiling trichlorides of propane) is effective against nematodes. The former is also a good fungicide and has been successfully used for killing fairy rings in established fields caused by *Marasmius oreades* and for the sterilization of ground used for raising cherry stocks from seed.

(4) Besides, some other fumigants, viz., Ethylene dichloride, Methyl bromide and Ethylene oxide have also been tried in America. Of these Methyl bromide has the advantage over other fumigants in that plants can resist concentrations of 1 lb. of methyl bromide per 1,000 c. ft. of air, so part of bed can be treated while plants are growing in another part.

The following precautions are necessary when using soil fumigants—

1. Many chemical soil fumigants are injurious to humans and care should be exercised in their use.
2. All except methyl bromide and Cheshunt compound kill living plants therefore, the soil must not be used for planting until all trace of these materials is gone. This usually takes two or three weeks.
3. As most of these compounds depend for their sterilization on evaporation and the subsequent permeation of the soil by the gas, sterilization should be carried out in warm weather.

Soil sterilization on a field scale is uneconomical except where the crop gives a particularly high return per acre. It is recommended to commercial nurserymen or growers whose livelihood depends upon the raising of seedlings or glasshouse crops.

Protection against aphids by seed treatment*

By soaking the seeds in an aqueous solution of bis (bisdimethylamino phosphorous) anhydride the establishment of aphids and red spider on the plants grown from them is prevented for a considerable time (more than fifty days under the experimental conditions employed.) The treatment is prophylactic rather than chemotherapeutic, the latter term being rightly applicable only to the cure of an attack by pest or disease after its establishment.

The treatment has no phytocidal effect. It may, therefore, have practical application in the control of aphids and other insects on suitable plants, provided the seed is large enough to allow for the absorption of sufficient of the active principle. The strength of the solution ranged from 0·16 to 0·5 per cent and soaking is done for 24 hours.

*Extract from Science Newsletter No. 3, Dec. 1950, issued by the Scientific Adviser to the High Commissioner, India House, London.

Precautions in using dinitro weedkillers†

Among the selective weedkillers in use in Queensland is a material which has as its active constituent sodium dinitro-ortho-cresylate. This is used in Queensland mainly for the chemical weeding of onion crops.

Several deaths and numerous cases of non-fatal poisoning by dinitro compounds have occurred overseas, mainly among sprayers working in grain crops in warm weather. The purpose of this note is to draw the attention of farmers to the hazards of using dinitro compounds without adequate precautions.

Some people are more susceptible than others to poisoning by dinitros. The more contact a man has with the material, the greater the risk he runs. The average onion grower, with only a comparatively small area to treat and using dinitro spray perhaps for only a short period each year, would not be exposed to nearly the same danger, as a team of men engaged on contract spraying. Nevertheless, the danger of poisoning is there and should be guarded against.

HOW POISONING MAY OCCUR

Dinitro compounds may cause poisoning by being swallowed, by being breathed in, or by being absorbed through the skin. No great amount is likely to be swallowed, but both inhalation and skin absorption can happen quite easily. Skin absorption probably presents the greatest risk of all, because dinitros do not set up an irritation when they are spilt on the skin and a fatal dose could easily be absorbed through the pores unnoticed. Incidentally, the amount of yellow skin discolouration is no indication of how much the skin has absorbed.

PRECAUTIONS TO BE TAKEN

Anyone handling dinitro compounds, even occasionally, is advised by the Director-General of Health and Medical Services to observe the following precautionary measures :—

1. Beware of concentrated solutions. If any of the concentrate splashes on to the skin, wash it off immediately with soap and water. If it soaks through the clothes, change them at once. The greatest danger lies in absorbing the concentrate through the skin.

2. Avoid contamination with the spraying solution even though it is dilute enough to be comparatively harmless. Repeated contact may cause poisoning.

   (*a*) Don't use leaking apparatus or overfill the knapsack spray so that the solution spills on the clothes and skin.

   (*b*) Whenever possible, spray in calm periods when it is possible to avoid the mist while spraying.

   (*c*) Do not adjust the nozzles while the spray is running, otherwise quite a deal of spray may be inhaled.

3. Take care with the residue which dries out on the spraying apparatus—it can be dangerous.

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†Extract from Queensland Agricultural Journal 72 (3) March 1951.

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SYMPTOMS

The symptoms of dinitro poisoning are easily recognised. Excessive thirst, excessive sweating and progressive loss of weight are the danger signs. If any or all of these symptoms are noticed, stop using the spray and see a doctor immediately.

Physical and Chemical treatment of loose smut[1]

Immersion of loose-smut-affected barley seed in a solution of spergon (tetra-chloro-para-benzoquinone) for periods up to 40 hours preceded by pre-soaking in ordinary water for 6 hours, considerably reduced smut infection in plants raised from such seed. Efficiency of the treatment increased with enhancement in the duration of immersion in the chemical solution. Immersion for 40 hours in a 0·2 per cent solution reduced the infection by 99·8 per cent. Though the stand of healthy plants was reduced by 20 per cent at this duration, it is considered to be of minor significance in practice. Several other chemicals tried proved either ineffective or greatly reduced the stand. Supersonic vibrations passed through steel containers also adequately reduced the smut infection.

New Nicotine Synergists[2]

Nicotine becomes nearly ten-fold more effective when it is mixed with polyethyleneglycol derivatives. The latter increase the toxicity of nocotine by improving its ability to penetrate the insect cuticle.

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1. Tyner, L.E., Soi. Agri., 31 : 187, 1951.
2. Saunders, D. H. and Willaman, J. J., Conn. Agri. Expt. St. Bull., 543, 1951.